

FILE NO. SM-CTV-O-158

*COLOR TELEVISION*

# ***SERVICE MANUAL***

*MODEL NO. 14BM18*

*CHASSIS NO. EX-1A3*

*Please read this manual carefully before service*

# TABLE OF CONTENTS

<b>SPECIFICATIONS</b>	1
<b>SAFETY INSTRUCTIONS AND MAINTENANCE</b>	2
X-RAY RADIATION PRECAUTION	2
SAFETY PRECAUTION	2
PRODUCT SAFETY NOTICE	3
SAFETY SYMBOL DESCRIPTION	3
MAINTENANCE	4
<b>ADJUSTMENTS</b>	5
SET-UP ADJUSTMENTS	5
CIRCUIT ADJUSTMENTS	8
<b>STRUCTURE AND CHASSIS FUNCTION DESCRIPTION</b>	15
STRUCTURE BLOCK DIAGRAM	15
BLOCK DIAGRAM FOR SUPPLY VOLTAGE SYSTEM	16
CHASSIS DESCRIPTION	17
<b>SERVICE DATA</b>	18
TECHNICAL DATA OF KEY ICS	18
WAVEFORMS OF KEY POINTS	31
SERVICE DATA OF KEY ICS	33
REPLACEMENT OF PARTS	36
<b>APPENDIX</b>	
1. CIRCUIT DIAGRAM	
2. PRINTED CIRCUIT BOARD DIAGRAMS	
3. FINAL WIRING DIAGRAM	
4. FINAL ASSEMBLY DIAGRAM	

**SPECIFICATIONS**

Model Number		14BM18
RF system	Color system	PAL4.43, NTSC3.58, NTSC4.43, SECAM
	Sound system	B/G, I, M, D/K
Receiving channel	VHF	C1~C12 (49.75-85.25MHz, 168.25-216.25MHz)
	UHF	C13~C57 (471.25-863.25MHz)
	CATV	Z1~Z7 (111-167MHz) Z8~Z35 (223-447MHz)
Programs preset		236(0-235)
Antenna input		75 $\Omega$ (unbalanced)
Picture tube (Approx.) Effective screen dimensions		280×210mm
Audio output (THD≤7%)		2W×2
Power source		110-240V ~, 50/60Hz
Weight (Approx.)		10.5kg
Dimensions (W×H×D) (Approx.)		416×332×390mm
Rated power consumption		69W

*Note: Designs and specifications are subject to change without notice.*

## INSTRUCTIONS FOR SERVICE SAFETY AND MAINTENANCE

*WARNING: BEFORE SERVICING THIS CHASSIS, READ THE "X-RAY RADIATION PRECAUTION", "SAFETY PRECAUTION" AND "PRODUCT SAFETY NOTICE" INSTRUCTION BELOW.*

### X-RAY RADIATION PRECAUTION

1. The EHT must be checked every time the TV is serviced to ensure that the CRT does not emit X-ray radiation as result of excessive EHT voltage. The maximum EHT voltage permissible in any operating circumstances must not exceed the rated value. When checking the EHT, use the High Voltage Check procedure in this manual using an accurate EHT voltmeter.
2. The only source of X-RAY radiation in this TV is the CRT. The TV minimizes X-RAY radiation, which ensures safety during normal operation. To prevent X-ray radiation, the replacement CRT must be identical to the original fitted as specified in the parts list.
3. Some components used in this TV have safety related characteristics preventing the CRT from emitting X-ray radiation. For continued safety, replacement component should be made after referring the PRODUCT SAFETY NOTICE below.
4. Service and adjustment of the TV may result in changes in the nominal EHT voltage of the CRT anode. So ensure that the maximum EHT voltage does not exceed the rated value after service and adjustment.

### SAFETY PRECAUTION

*WARNING: REFER SERVICING TO QUALIFIED SERVICE PERSONNEL ONLY.*

1. The TV has a nominal working EHT voltage. Extreme caution should be exercised when working on the TV with the back removed.
  - 1.1 Do not attempt to service this TV if you are not conversant with the precautions and procedures for working on high voltage equipment.
  - 1.2 When handling or working on the CRT, always discharge the anode to the TV chassis before removing the anode cap in case of electric shock.
  - 1.3 The CRT, if broken, will violently expel glass fragments. Use shatterproof goggles and take extreme care while handling.
  - 1.4 Do not hold the CRT by the neck as this is a very dangerous practice.
2. It is essential that to maintain the safety of the customer all power cord forms be replaced exactly as supplied from factory.
3. Voltage exists between the hot and cold ground when the TV is in operation. Install a suitable isolating transformer of beyond rated overall power when servicing or connecting any test equipment for the sake of safety.
4. When replacing ICs, use specific tools or a static-proof electric iron with small power (below 35W).

## SERVICE MANUAL

---

5. Do not use a magnetized screwdriver when tightening or loosening the deflection yoke assembly to avoid electronic gun magnetized and decrement in convergence of the CRT.
6. When remounting the TV chassis, ensure that all guard devices, such as nonmetal control buttons, switch, insulating sleeve, shielding cover, isolating resistors and capacitors, are installed on the original place.
7. Replace blown fuses within the TV with the fuse specified in the parts list.
8. When replacing wires or components to terminals or tags, wind the leads around the terminal before soldering. When replacing safety components identified by the international hazard symbols on the circuit diagram and parts list, it must be the company-approved type and must be mounted as the original.
9. Keep wires away from high temperature components.

## PRODUCT SAFETY NOTICE

***CAUTION: FOR YOUR PROTECTION, THE FOLLOWING PRODUCT SAFETY NOTICE SHOULD BE READ CAREFULLY BEFORE OPERATING AND SERVICING THIS TV SET.***

1. Many electrical and mechanical components in this chassis have special safety-related characteristics. These characteristics are often passed unnoticed by a visual inspection and the X-ray radiation protection afforded by them cannot necessarily be obtained by using replacements rated at higher voltages or wattage, etc. Components which have these special safety characteristics in this manual and its supplements are identified by the international hazard symbols on the circuit diagram and parts list. Before replacing any of these components read the parts list in this manual carefully. Substitute replacement components which do not have the same safety characteristics as specified in the parts list may create X-ray radiation.
2. Do not slap or beat the cabinet or CRT, since this may result in fire or explosion.
3. Never allow the TV sharing a plug or socket with other large-power equipment. Doing so may result in too large load, causing fire.
4. Do not allow anything to rest on or roll over the power cord. Protect the power cord from being walked on, modified, cut or pinched, particularly at plugs.
5. Do not place any objects, especially heavy objects and lightings, on top of the TV set. Do not install the TV near any heat sources such as radiators, heat registers, stove, or other apparatus that produce heat.
6. Service personnel should observe the SAFETY INSTRUCTIONS in this manual during use and servicing of this TV set. Otherwise, the resulted damage is not protected by the manufacturer.

## SAFETY SYMBOL DESCRIPTION



The lightning symbol in the triangle tells you that the voltage inside this product may be strong enough to cause an electric shock. Extreme caution should be exercised when

working on the TV with the back removed.



This is an international hazard symbol, telling you that the components identified by the symbol have special safety-related characteristics.



**FDA** This symbol tells you that the critical components identified by the FDA marking have special safety-related characteristics.

**UL** This symbol tells you that the critical components identified by the UL marking have special safety-related characteristics.

**C UL** This symbol tells you that the critical components identified by the C-UL marking have been evaluated to the UL and C-UL standards and have special safety-related characteristics.

**VDE** This symbol tells you that the critical components identified by the VDE marking have special safety-related characteristics.

## MAINTENANCE

1. Install the TV set on a stable and level surface. Do not place the set near or over a radiator or heat register, or where it is exposed to direct sunlight.
2. Do not install the TV set in a place exposed to rain, water, excessive dust, mechanical vibrations or impacts.
3. Allow enough space (at least 10cm) between the TV and wall or enclosures for proper ventilation.
4. Slots and openings in the cabinet should never be blocked by clothes or other objects.
5. Please power off the TV set and disconnect it from the wall immediately if any abnormal condition are met, such as bad smell, belching smoke, sparkling, abnormal sound, no picture/sound/raster. Hold the plug firmly when disconnecting the power cord.
6. Unplug the TV set from the wall outlet before cleaning or polishing it. Use a dry soft cloth for cleaning the exterior of the TV set or CRT screen. Do not use liquid cleaners or aerosol cleaners.

## ADJUSTMENTS

### SET-UP ADJUSTMENTS

The following adjustments should be made when a complete realignment is required or a new picture tube is installed.

Perform the adjustments in the following order:

1. Color purity
2. Convergence
3. White balance

**Notes:**

- ① The purity/convergence magnet assembly and rubber wedges need mechanical positioning.
- ② For some picture tubes, purity/ convergence adjustments are not required.

#### 1. **Color Purity Adjustment**

Preparation:

Before starting this adjustment, adjust the vertical sync, horizontal sync, vertical amplitude and focus.

- 1.1 Face the TV set north or south.
- 1.2 Connect the power plug into the wall outlet and turn on the main power switch of the TV set.
- 1.3 Operate the TV for at least 15 minutes.
- 1.4 Degauss the TV set using a specific degaussing coil.
- 1.5 Set the brightness and contrast to maximum.
- 1.6 Counter clockwise rotate the R/B low brightness potentiometers to the end and rotate the green low brightness potentiometer to center.
- 1.7 Receive green raster pattern signals.
- 1.8 Loosen the clamp screw holding the deflection yoke assembly and slide it forward or backward to display a vertical green zone on the screen. Rotate and spread the tabs of the purity magnet around the neck of the CRT until the green zone is located vertically at the center of the screen.
- 1.9 Slowly move the deflection yoke assembly forward or backward until a uniform green screen is obtained.
- 1.10 Tighten the clamp screw of the assembly temporarily. Check purity of the red raster and blue raster until purities of the three rasters meet the requirement.

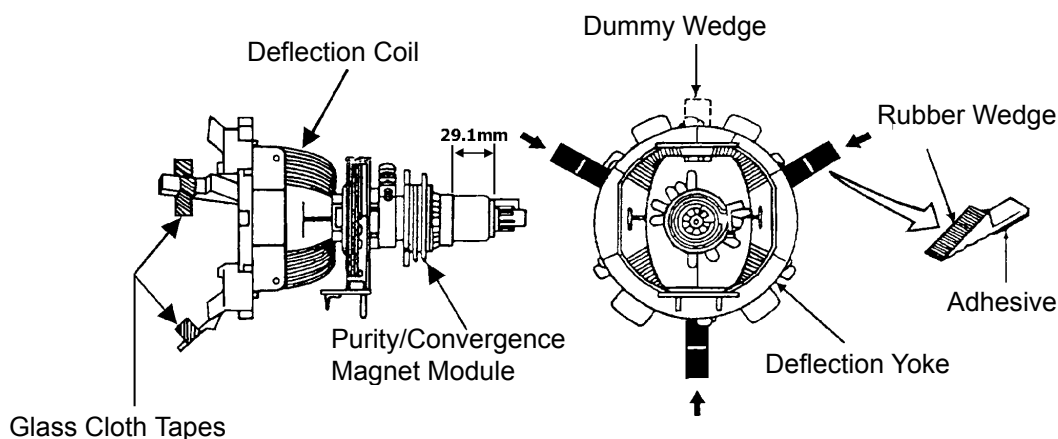


Fig. 1

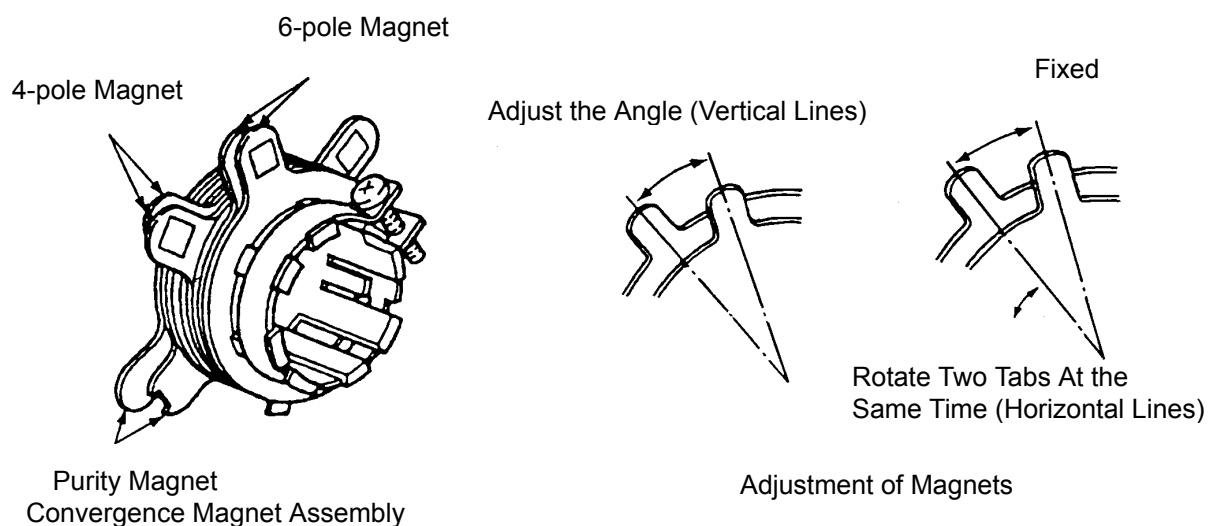


Fig. 2

## 2. Convergence Adjustment

Preparation:

Before attempting any convergence adjustment, the TV should be operated for at least 15 minutes.

### 2.1 Center convergence adjustment

- 2.1.1 Receive dot pattern.
- 2.1.2 Adjust the brightness/contrast controls to obtain a sharp picture.
- 2.1.3 Adjust two tabs of the 4-pole magnet to change the angle between them and red and blue vertical lines are superimposed each other on the center of the screen.
- 2.1.4 Turn both tabs at the same time keeping the angle constant to superimpose red and blue horizontal on the center of the screen.
- 2.1.5 Adjust two tabs of the 6-pole magnet to superimpose red/blue line and green line.
- 2.1.6 Remember red and blue movement. Repeat steps 2.1.3-2.1.5 until optimal convergence is



obtained.

## 2.2 Circumference convergence adjustment

- 2.2.1 Loosen the clamp screw holding the deflection yoke assembly and allow it tilting.
- 2.2.2 Temporarily put the first wedge between the picture tube and deflection yoke assembly. Move front of the deflection yoke up or down to obtain better convergence in circumference. Push the mounted wedge in to fix the yoke temporarily.
- 2.2.3 Put the second wedge into bottom.
- 2.2.4 Move front of the deflection yoke to the left or right to obtain better convergence in circumference.
- 2.2.5 Fix the deflection yoke position and put the third wedge in either upper space. Fasten the deflection yoke assembly on the picture tube.
- 2.2.6 Detach the temporarily mounted wedge and put it in either upper space. Fasten the deflection yoke assembly on the picture tube.
- 2.2.7 After fastening the three wedges, recheck overall convergence and ensure to get optimal convergence. Tighten the lamp screw holding the deflection yoke assembly.

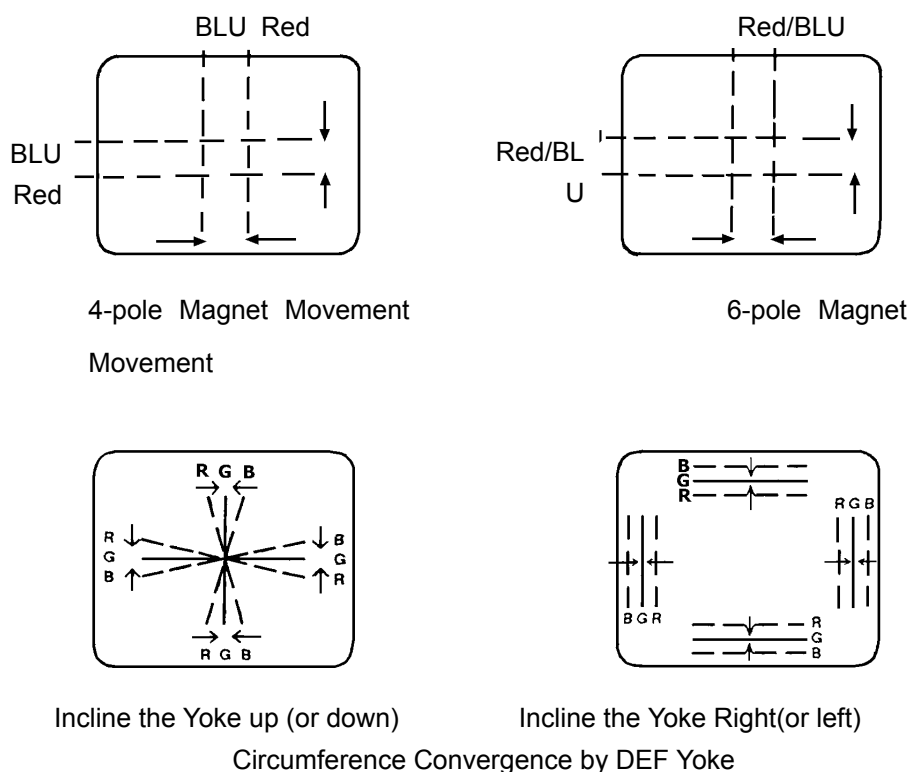


Fig. 3

## 3. White Balance Adjustment

Generally, white balance adjustment is made with professional equipment. It's not practical to get good white balance only through manual adjustment. For TVs with I<sup>2</sup>C bus control, change the bus data to adjust white balance.

## CIRCUIT ADJUSTMENTS

Preparation:

Circuit adjustments should be made only after completion of set-up adjustments.

Circuit adjustments can be performed using the adjustable components inside the TV set. For TVs with I<sup>2</sup>C bus control, first change the bus data.

### 1. Degaussing

A degaussing coil is built inside the TV set. Each time the TV is powered on, the degaussing coil will automatically degauss the TV. If the TV is magnetized by external strong magnetic field, causing color spot on the screen, use a specific degausser to demagnetize the TV in the following ways. Otherwise, color distortion will be shown on the screen.

- 1.1 Power on the TV set and operate it for at least 15 minutes.
- 1.2 Receive red full-field pattern.
- 1.3 Power on the specific degausser and face it to the TV screen.
- 1.4 Turn on the degausser. Slowly move it around the screen and slowly take it away from the TV.
- 1.5 Repeat the above steps until the TV is degaussed completely.

### 2. Supply Voltage Adjustment

*Caution: +B voltage has close relation to high voltage. To prevent X-ray radiation, set +B voltage to the rated voltage.*

- 2.1 Make sure that the supply voltage is within the range of the rated value.
- 2.2 Connect a digital voltmeter to the +B voltage output terminal of the TV set. Power on the TV and set the brightness and sub-brightness to minimum.
- 2.3 Regulate voltage adjustment components on the power PCB to make the voltmeter read 115±1V.

### 3. High Voltage Inspection

*Caution: No high voltage adjustment components inside the chassis. Please perform high voltage inspection in the following ways.*

- 3.1 Connect a precise static high voltmeter to the second anode (inside the high voltage cap) of the picture tube.
- 3.2 Plug in the supply socket (110-240V, AC, 50/60Hz) and turn on the TV. Set the brightness and contrast to minimum (0 μA).
- 3.3 The high voltage reading should be less than the EHT limitation.
- 3.4 Change the brightness from minimum to maximum, and ensure high voltage not beyond the limitation in any case.

Nominal EHT voltage: 22 ± 1.3KV      Limited EHT voltage: 25KV

### 4. Focus Adjustment

*Caution: Dangerously high voltages are present inside the TV. Extreme caution should be exercised when working on the TV with the back removed.*

- 4.1 After removing the back cover, look for the FBT on the main PCB. There should be a FCB on the

FBT.

4.2 Power on the TV and preheat it for 15 min.

4.3 Receive a normal TV signal. Rotate knob of the FCB until you get a sharp picture.

## **5. Safety Inspection**

### **5.1 Inspection for insulation and voltage-resistant**

Perform safety test for all naked metal of the TV. Supply high voltage of 3000V AC, 50Hz (limit current of 10mA) between all naked metal and cold ground. Test every point for 3 min. and ensure no arcing and sparking.

### **5.2 Requirements for insulation resistance**

Measure resistance between naked metal of the TV and feed end of the power cord to be infinity with a DC-500 high resistance meter and insulation resistance between the naked metal and degaussing coil to be over 20M  $\Omega$ .

## **6. DESIGN/SERVICE mode**

### **6.1 To enter the USER SERVICE mode**

Caution: The user service mode adjustment can be changed only when service personnel adjust the whole set data during servicing. As the control data have dramatic effects on functions and performance of the TV, service personnel should not tell user how to enter the SERVICE mode to avoid improper data settings.

- 6.1.1 Set the volume to 0. Then press and hold the MUTE button on the remote control, and press the MENU button on the TV to enter the SERVICE mode. (In this case, the S mode cannot be stored in the EEPROM. To exit from the S mode, turn off the TV set. )

- 6.1.2 After entering the S mode, Red "S" is displayed on the upper center of the screen and MENU1 is default. Use the POS+/- buttons to highlight an adjustment and the VOL+/- buttons to adjust it. The adjusted data are immediately output and stored in the EEPROM

S
<b>VS 0-3F 25</b>
XXXXXXXX

### **6.2 Bus data in the S mode**

Table 1 Adjustment and Option Data in S mode

Item	Adjustment	Description	Remarks
CORE	03	Coring (for some CPU only)	
0-IF	20	Sound adjustment setting (for some CPU only)	
5PAR/6PAR	1F	Parallelogram correction (for large-screen only)	
5BOW/6BOW	1F	Curve correction (for large-screen only)	

(continued)

## SERVICE MANUAL

5HSH/6H SH	Set to the optimal mode	Horizontal center in the TV mode for 50Hz/60Hz For 50Hz, "5HSH" is displayed; for 60Hz, "6HSH" is displayed.	*
5EWW/6 EWW	1F	East-West correction (for large-screen only)	
5EWP/6 EWP	1F	East-West parabola correction (for large-screen only)	
5UCR/6 UCR	1F	Upper corner parabola correction (for large-screen only)	
5LCR/6L CR	1F	Lower corner parabola correction (for large-screen only)	
5EWT/6 EWT	1F	Trapezoidal correction (for large-screen only)	
5VSL/6V SL	1F	Vertical slope (for large-screen only)	*
5VAM/6V AM	1F	Vertical amplitude; For 50Hz, "5VAM" is displayed; for 60Hz, "6VAM" is displayed.	*
5SCL/6S CL	Set to the optimal mode	S correction	*
5VSH/6V SH	Set to the optimal mode	Vertical center in the TV mode for 50Hz/60Hz. For 50Hz, "5VSH" is displayed; for 60Hz, "6VSH" is displayed.	*
5VOF/6V OF	Set to the optimal mode	OSD vertical center	*
VX	19	Vertical zoom (for large-screen only)	
RED	20	Red gun cutoff voltage	*
GRN	20	Green gun cutoff voltage	*
WPR	1F	Red gun drive voltage	*
WPG	1F	Green gun drive voltage	*
WPB	1F	Blue gun drive voltage	*
YDFP/Y DFN	07	PAL brightness delay time/ NTSC brightness delay time	
TOP	10-1F	UOC AGC	*
VOL	26	TV audio output power can be adjusted by means of UOC audio output amplitude. Generally, UOC audio output amplitude is set to 26 for 21" models with stereo output of 3W+3W; 2C for 21" models with stereo output of 5W+5W; 24 for 14" models with mono output of 2WX2; 22 for 14" models with mono output of 1WX2.	***

(continued)

## SERVICE MANUAL

IFFS	03 (02)	PIF (02-38.9MHz, 03-38MHz)	
HDOL	00-07	Cathode drive level (typical: 04-07)	
AGC	03	IF ACG speed	
VG2B	3A	VG2 brightness setting(VG2B): 3A for 21" models; 2E for 14" models; Contrast Max. setting (MCON): 30 for 21" Malaysia Matsushita or BMCC CRT with ferrite mask; MCON: 30; VG2B: 30, HDOL: 04 for 21" Chunghwa CRT	
SBRI	1F	Sub brightness	
MBRI	30	Brightness Max.	
SCON	20	Sub contrast	
MCON	39	Contrast Max.	
SCOL	32	Sub color	
OP1	87	Option set byte 1	***
OP2	01	Option set byte 2	***
OP3	FF	Option set byte 3	***
OP4	F6	Option set byte 4	***
OP5	76	Option set byte 5	***
OP6	1C	Option set byte 6	***
INIT		EEPROM initialization	
VG2		Adjusting screen voltage with VG2	*
VSD		Vertical output off	
STS0/1/2		System status byte	

### Notes:

- ① The data marked with “\*” have been adjusted in the MANUFACTURE mode. Take care when in service and adjustment.
- ② To write in logo, use the ↓ / ↑ buttons to highlight an adjustment and the ← / → buttons to adjust.
- ③ The data sheet may differ dependent on different models.
- ④ The data sheet may differ dependent on different CRTs for the same model.

### 6.3 Option set

With remote control system software TDA935X, all options can be set in the SERVICE mode and stored in EEPROM. Data related to picture, sound and geometric adjustment are also stored in EEPROM.

## SERVICE MANUAL

### Table 2 Function Option Bit Setting

	Bit	Item	Description	Data
OP1	0	OP_HOTEL	Hotel mode (1: Yes, 0: No)	<u>1</u>
	1	OP_236	Channels preset: 1: 236 channels 0: 100 channels	<u>1</u>
	2	OP_NTSC	NTSC color system options: 1: Yes, 0: No	1
	3	OP_AV2	Two sets of AV inputs: 1: Two sets of separate AV inputs 0: Two sets of parallel AV inputs or one set of AV inputs	1/0
	4	OP-SVSH	S-Video terminal: 1: Yes, 0: No	1
	5	OP-DVD	DVD component input: 1: Yes	1
	6	OP-RGB	RGB input: 1: Yes, 0: No	1
	7	OP-OSO	Switch off in vertical overscan	<u>1</u>
OP2	0	OP_AVL	AVL: 1: Yes	<u>1</u>
	1	OP_RFTOAV	AV RF output: 1: RF output (for models with SCART jack except EX-1A) 0: Monitor output (for models with RCA jack)	0/1
	2	OP_NOT_1	Teletext language setting (OP-NOT-3/2/1): 1XX-English/Arabic 011-English/Farsi 010-English/Russian 001-English/Ukrainian 000- English/Paneuro	0
	3	OP_NOT_2		0
	4	OP_NOT_3		0
	5	OP_USER-LOGO	User LOGO setting prior to CHANGHONG LOGO: 1: Display characters can be set by the VOL+/- buttons	<u>0</u>
	6	OP_ON-BLACK	Power-on auto test back selection: 1: Blue, 0: Black	<u>0</u>
	7	OP_FSL	Slicing level for vertical sync	<u>0</u>
OP3	0	OP_ENGLISH	English	1
	1	OP_FARSI	Farsi or Czech	1
	2	OP_ARABIC	Arabic or Slovakian	1
	3	OP_RUSSIAN	Russian	1
	4	OP_FRENCH	French	1
	5	OP_GERMAN	German	1
	6	OP_ITALY	Italian, Indonesian or Hungarian	1
	7	OP_SPANISH	Spanish, Malay or Croatian	1
OP4	0	OP_FMWS	Window selection of sound pll: small/large window	<u>0</u>

(continued)

## SERVICE MANUAL

	1	OP_DIRECT_SW ITCH_ON	Memory power-on (If turned off by the remote control, then the TV is turned on by the remote control; if turned off by the MAIN POWER SWITCH, then turned on by the MAIN POWER SWITCH.) 1: Yes	<u>1</u>
	2	OP_HCO	EHT tracking mode	<u>1</u>
	3	OP_LOGO	Changhong logo display: 1-Displayed without signal reception; 0-No	<u>0</u>
	4	OP_SOUND_DK	Sound system-D/K option setting	1
	5	OP_SOUND_BG	Sound system-B/G option setting	1
	6	OP_SOUND_I	Sound system-I option setting	1
	7	OP_SOUND_M	Sound system-M option setting	1
OP5	0	OP_TUNER	Tuner: 1: Philips-Tuner 0: Panasonic-Tuner	<u>0</u>
	1	OP_AUTO_LAN G0	Outgoing language option setting: (OP-AUTO-LANG2/1/0):	0
	2	OP_AUTO_LAN G1	English (000) Farsi (001)	0
	3	OP_AUTO_LAN G2	Arabic (010) Russian (011) French (100) German (101) Italian or Indonesian (110) Spanish or Malay (111)	0
	4	OP_FORF	Field frequency options (OP-FORS/FORF):	<u>1</u>
	5	OP_FORS	00- AUTO 60HZ, 01-KEEP LAST, 10-FORCE 60HZ, 11-AUTO 50HZ	<u>1</u>
	6	OP_AVON	If AV off, then AV on	<u>1</u>
	7	OP_ONPOSITIO N	With HOTEL mode preset, on position is fixed to POS1.	<u>0</u>
OP6	0	OP_AUTOTEST	Auto test when power-on (set to 0 typically)	0
	1	OP_PSNS	Sensitivity	<u>0</u>
	2	OP_BSCREEN	Black screen when changing channels: 1-Yes; 0-No	<u>1</u>
	3	OP_SECAM	SECAM color system option: 1: Yes	1
	4	OP_DFL	Disable flash protection	<u>1</u>
	5	OP_SIF	External SIF amplifier: 1: Yes, 0: No	1

(continued)

## SERVICE MANUAL

---

	6	OP_EXT_SIF0	Sound system options for external circuit (OP-EXT-SIF1/0): D/K: 00, B/G: 01, I: 10, M: 11.	1
	7	OP_EXT_SIF1	1: Sets sound system of external SIF as the appropriate one and also sets sound system in the course of auto demo as the appropriate one 0: Changes sound system in the course of auto demo.	0

**Notes:**

- ① Do not change the data marked with “\_” in “Data” column.
- ② Check if the color/sound systems conform to the specifications of different models after setting.



# STRUCTURE AND CHASSIS FUNCTION DESCRIPTION

## 1. STRUCTURE BLOCK DIAGRAM

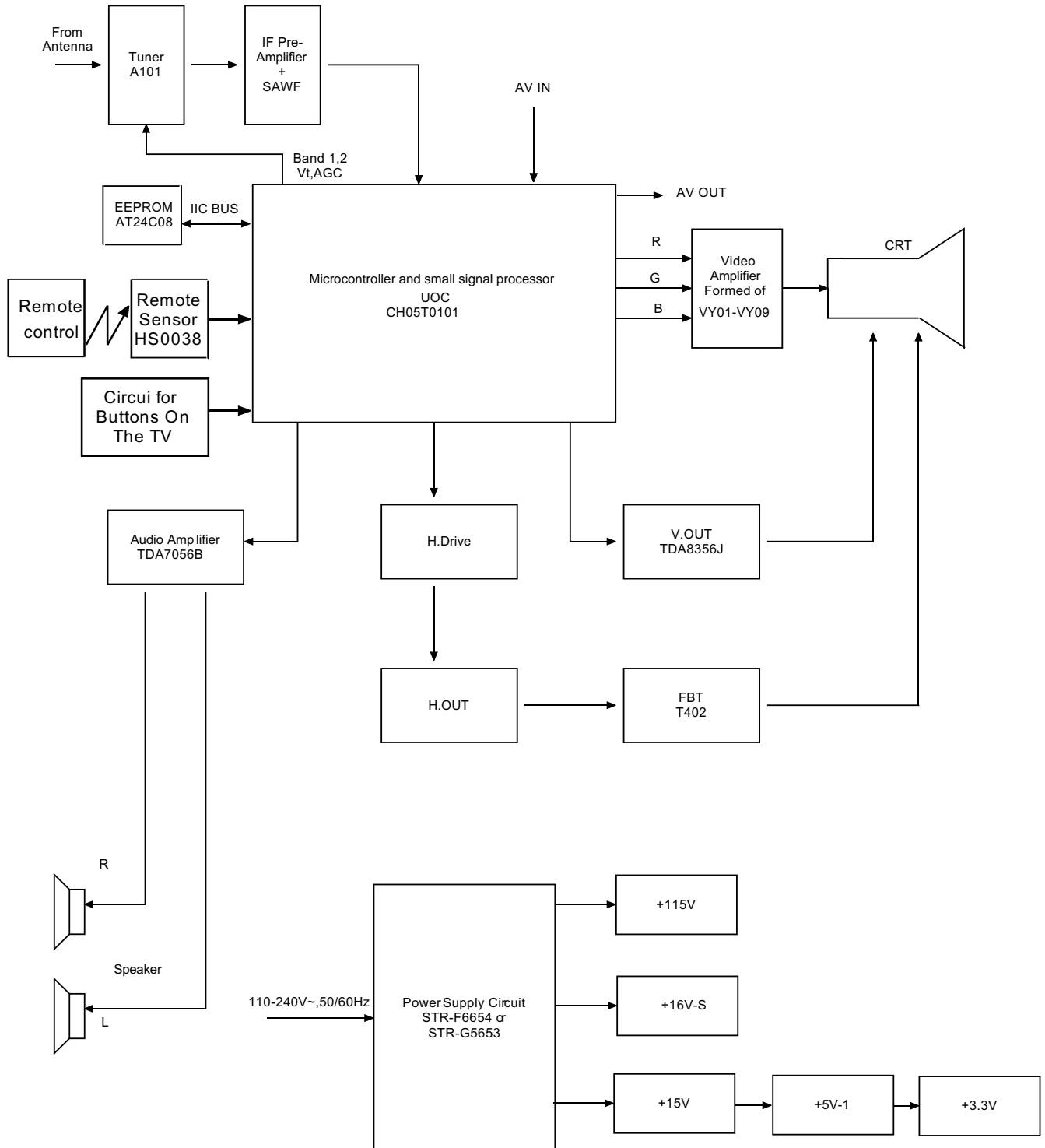


Fig.4 Structure Block Diagram for EX-1A3 Chassis Series

## 2. BLOCK DIAGRAM FOR SUPPLY VOLTAGE SYSTEM

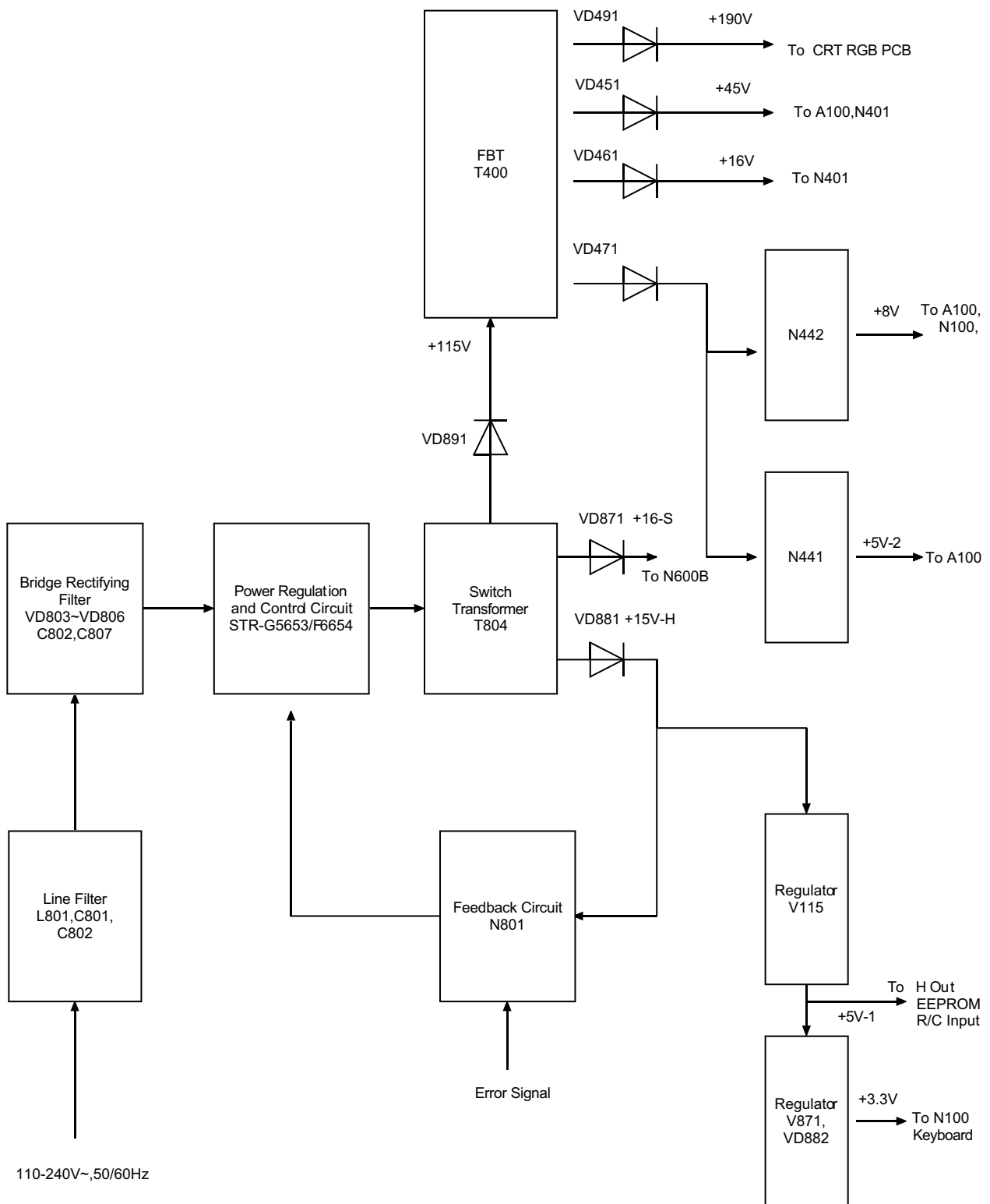


Fig.5 Block Diagram for EX-1A3 Supply Voltage System

### **3. CHASSIS DESCRIPTION**

#### **1). General Description**

EX-1A3 chassis series are applied in 14BM18 respectively which uses mainly Philips' advanced UOC-ultimate chip TDA935X/6X/8X and I<sup>2</sup>C-bus controlled IC. With combination of microcontroller and small signal processor, the TDA935X/6X/8X series feature high-integration, high-performance-to-price ratio and high-reliability and advanced functions with fewer external components, which provide much convenience for manufacturing and technical service.

#### **2). The EX-1A3 chassis series mainly use the following ICs and assemblies.**

Table 3 Key ICs and Assemblies

Serial No.	Position	Type	Function Description
1	N100	CH05T0102 (TDA935X/6X/8X)	Microcontroller and small signal processor (UOC)
2	N200	AT24C08	EEPROM
4	N401	TDA8356/N6	Vertical scan output stage circuit
3	N600B	TDA7056BB	Sound power amplifier
4	N861	STR-G5653	Power supply circuit
5	A100	TDQ-5B6M	Tuner

## SERVICE DATA

### 1. KEY ICS TECHNICAL DATA

#### 1.1 *Microcontroller and small signal processor TDA935X/6X/8X*

The super chips TDA935X/6X/8X are good in pins compatibility. Differences among them are shown as follows.

TDA9351 (48K)	PAL/NTSC/SECAM+1 PAGE TELETEST
TDA9350 (48K)	PAL/NTSC+1 PAGE TELETEST
TDA9361 (64K)	PAL/NTSC/SECAM+10 PAGE TELETEST
TDA9360 (64K)	PAL/NTSC+10 PAGE TELETEST
TDA9380 (32K)	PAL/NTSC
TDA9387 (32K)	NTSC

#### **TDA935X/6X/8X PS/N2 series TV signal processor-Teletext decoder with embedded $\mu$ -Controller**

##### **1) General Description**

The various versions of the TDA935X/6X/8X PS/N2 series combine the functions of a TV signal processor together with a  $\mu$ -Controller and US Closed Caption decoder. Most versions have a Teletext decoder on board. The Teletext decoder has an internal RAM memory for 1 or 10 page text. The ICs are intended to be used in economy television receivers with 90 $\mu$  and 110 $\mu$  picture tubes.

The ICs have supply voltages of 8 V and 3.3 V and they are mounted in S-DIP envelope with 64 pins.

The features are given in the following feature list. The differences between the various ICs are given in the table on page 4.

##### **2) Features**

##### **TV-signal processor**

- Multi-standard vision IF circuit with alignment-free PLL demodulator
  - Internal (switchable) time-constant for the IF-AGC circuit
  - A choice can be made between versions with mono intercarrier sound FM demodulator and versions with QSS IF amplifier.
  - The mono intercarrier sound versions have a selective FM-PLL demodulator which can be switched to the different FM sound frequencies (4.5/5.5/6.0/6.5 MHz).
- The quality of this system is such that the external band-pass filters can be omitted.
- Source selection between 'internal' CVBS and external CVBS or Y/C signals
  - Integrated chrominance trap circuit
  - Integrated luminance delay line with adjustable delay time
  - Picture improvement features with peaking (with variable centre frequency and positive/negative overshoot ratio) and black stretching
  - Integrated chroma band-pass filter with switchable centre frequency
  - Only one reference (12 MHz) crystal required for the
  - $\mu$ -Controller, Teletext- and the colour decoder
  - PAL/NTSC or multi-standard colour decoder with automatic search system

- Internal base-band delay line
- RGB control circuit with 'Continuous Cathode Calibration', white point and black level offset adjustment so that the colour temperature of the dark and the light parts of the screen can be chosen independently.
- Linear RGB or YUV input with fast blanking for external RGB/YUV sources. The Text/OSD signals are internally supplied from the  $\square$ -Controller/Teletext decoder
- Contrast reduction possibility during mixed-mode of OSD and Text signals
- Horizontal synchronization with two control loops and alignment-free horizontal oscillator
- Vertical count-down circuit
- Vertical driver optimized for DC-coupled vertical output stages
- Horizontal and vertical geometry processing
- Horizontal and vertical zoom function for 16 : 9 applications
- Horizontal parallelogram and bow correction for large screen picture tubes
- Low-power start-up of the horizontal drive circuit

### **TV signal processor-Teletext decoder with embedded $\square$ -Controller TDA935X/6X/8X PS/N2 series**

- **$\square$ -Controller**
- 80C51  $\square$ -controller core standard instruction set and timing
- 1  $\square$ s machine cycle
- 16 - 128Kx8-bit late programmed ROM
- 3 - 12Kx8-bit DATA RAM (shared between Display, Acquisition and Auxiliary Ram)
- Interrupt controller for individual enable/disable with two level priority
- Two 16-bit Timer/Counter registers
- One 16 bit Timer with 8-bit Pre-scaler
- WatchDog timer
- Auxiliary RAM page pointer
- 16-bit Data pointer
- Stand-by, Idle and Power Down (PD) mode
- 14 bits PWM for Voltage Synthesis Tuning
- 8-bit A/D converter
- 4 pins which can be programmed as general I/O pin, ADC input or PWM (6-bit) output

### **Data Capture**

- Text memory for 0, 1 or 10 pages
- In the 10 page versions inventory of transmitted Teletext pages stored in the Transmitted Page Table (TPT) and Subtitle Page Table (SPT)
- Data Capture for US Closed Caption
- Data Capture for 525/625 line WST, VPS (PDC system A) and Wide Screen Signalling (WSS) bit decoding
- Automatic selection between 525 WST/625 WST
- Automatic selection between 625 WST/VPS on line 16 of VBI
- Real-time capture and decoding for WST Teletext in Hardware, to enable optimized  $\square$ -processor throughput
- Automatic detection of FASTEXT transmission
- Real-time packet 26 engine in Hardware for processing accented, G2 and G3 characters

## SERVICE MANUAL

- Signal quality detector for video and WST/VPS data types
- Comprehensive teletext language coverage
- Full Field and Vertical Blanking Interval (VBI) data capture of WST data

### Display

- Teletext and Enhanced OSD modes
- Features of level 1.5 WST and US Close Caption
- Serial and Parallel Display Attributes
- Single/Double/Quadruple Width and Height for characters
- Scrolling of display region
- Variable flash rate controlled by software
- Enhanced display features including overlining, underlining and italics
- Soft colours using CLUT with 4096 colour palette
- Globally selectable scan lines per row (9/10/13/16) and character matrix [12x10, 12x13, 12x16 (VxH)]
- Fringing (Shadow) selectable from N-S-E-W direction
- Fringe colour selectable
- Meshing of defined area
- Contrast reduction of defined area
- Cursor
- Special Graphics Characters with two planes, allowing four colours per character
- 32 software redefinable On-Screen display characters
- 4 WST Character sets (G0/G2) in single device (e.g. Latin, Cyrillic, Greek, Arabic)
- G1 Mosaic graphics, Limited G3 Line drawing characters
- WST Character sets and Closed Caption Character set in single device

### Functional Difference Between The Various IC Versions

**IC Version (TDA) 9350 9351 9352 9353 9360 9361 9362 9363 9364 9365 9366 9367 9380 9381 9382 9383 9384 9385 9386 9387 9388 9389**

**Table 4**

IC VERSION(TDA)	9350	9351	9352	9353	9360	9361	9362	9363	9364	9365	9366	9367	9380	9381	9382	9383	9384	9385	9386	9387	9388	9389
TV range	90°	90°	90°	110°	90°	90°	110°	110°	110°	110°	90°	90°	90°	90°	90°	110°	110°	110°	110°	90°	110°	110°
Mono intercarrier multi –standard sound demodulator (4.5–6.5 MHz) with switchable centre frequency	✓	✓		✓	✓	✓	✓	✓					✓	✓		✓	✓			✓	✓	
Audio switch	✓	✓			✓	✓	✓	✓					✓	✓		✓	✓			✓	✓	
Automatic Volume Levelling	✓	✓	✓	✓	✓	✓					✓	✓	✓	✓	✓							
Automatic Volume Levelling or subcarrier output (for combfilter applications)							✓	✓	✓	✓						✓	✓	✓	✓	✓	✓	✓
Qss sound IF amplifier with separate input and AGC circuit			✓						✓	✓	✓	✓			✓			✓	✓			✓
AM sound demodulator without extra reference circuit										✓									✓			
PAL decoder	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			
SECAM decoder		✓	✓	✓	✓	✓		✓		✓		✓	✓	✓	✓		✓		✓			
NTSC decoder	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Horizontal geometry (E–W)				✓			✓	✓	✓	✓						✓	✓	✓	✓		✓	✓
Horizontal and Vertical Zoom				✓			✓	✓	✓	✓						✓	✓	✓	✓		✓	✓
ROM size	32–64K	32–64K	32–64K	32–64K	64–128K	64–128K	64–128K	64–128K	64–128K	64–128K	64–128K	64–128K	16–64K	16–64K	16–64K	16–64K	16–64K	16–64K	16–64K	16–64K	16–64K	16–64K
User RAM size	1K	1K	1K	1K	2K	2K	2K	2K	2K	2K	2K	2K	1K	1K	1K	1K	1K	1K	1K	1K	1K	1K
Teletext	1 page	1 page	1 page	1 page	10 page	10 page	10 page	10 page	10 page	10 page	10 page	10 page										
Closed captioning	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

### 3) Block Diagram

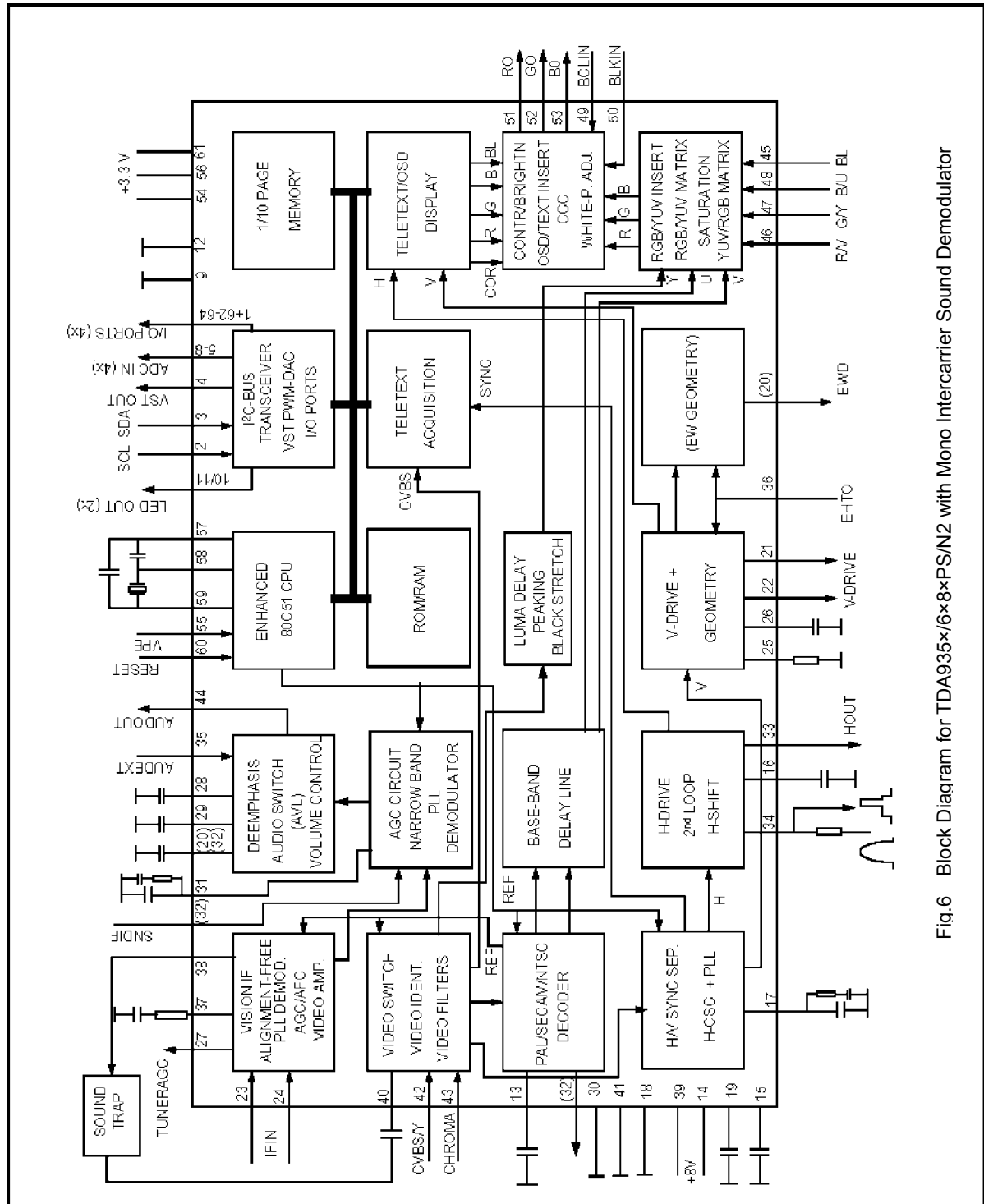


Fig.6 Block Diagram for TDA935x/6x8xPSN2 with Mono Intercarrier Sound Demodulator

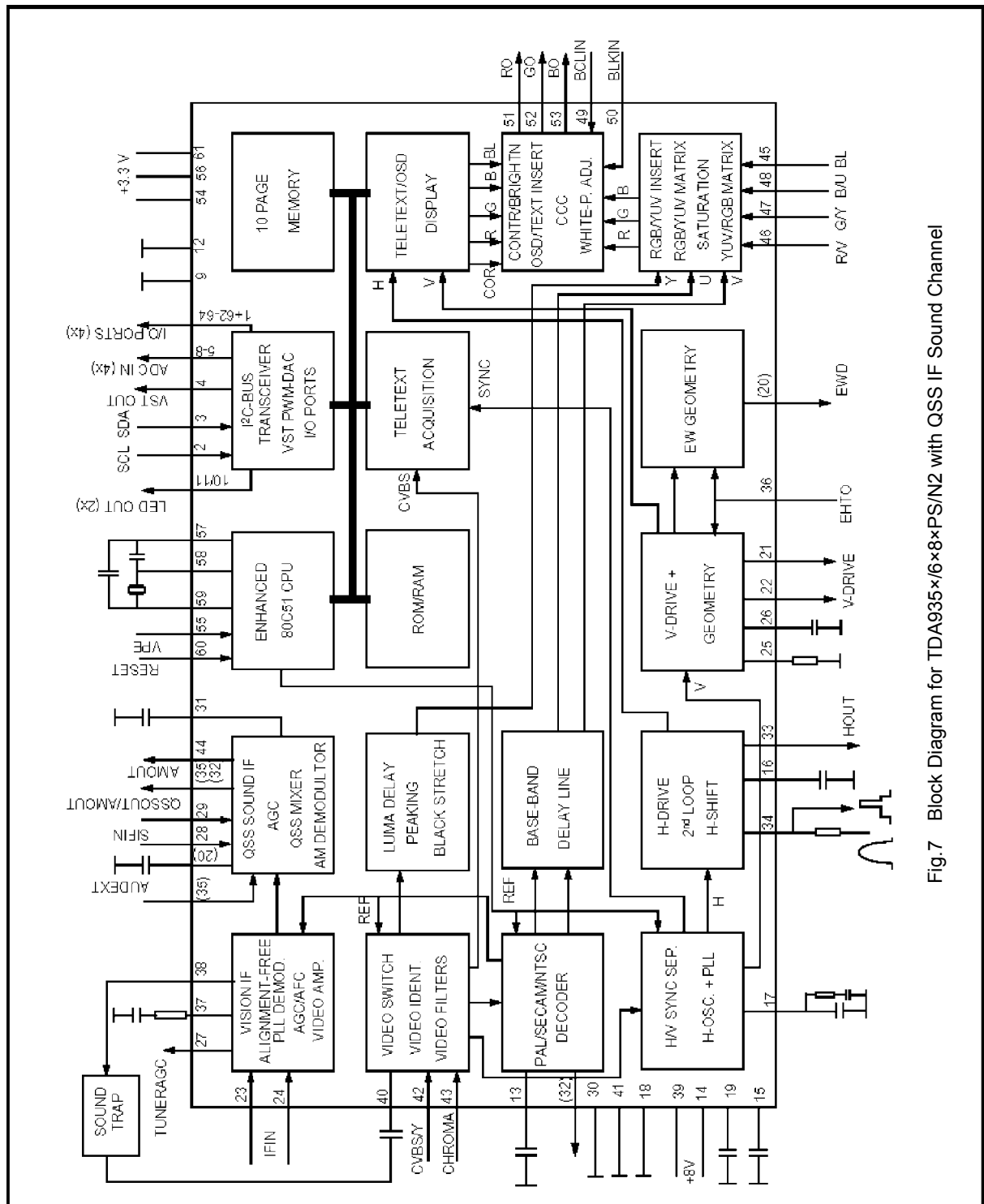


Fig.7 Block Diagram for TDA935x/6x8xPS/N2 with QSS IF Sound Channel



**4) pinning**

**Table 5**

SYMBOL	PIN	DESCRIPTION
P1.3/T1	1	port 1.3 or Counter/Timer 1 input
P1.6/SCL	2	port 1.6 or I <sup>2</sup> C-bus clock line
P1.7/SDA	3	port 1.7 or I <sup>2</sup> C-bus data line
P2.0/TPWM	4	port 2.0 or Tuning PWM output
P3.0/ADCO/PWMO	5	port 3.0 or ADC0 input or PWM0 output
P3.1/ADC1/PWM1	6	port 3.1 or ADC1 input or PWM1 output
P3.2/ADC1/PWM2	7	port 3.2 or ADC2 input or PWM2 output
P3.3/ADC3/PWM3	8	port 3.3 or ADC3 input or PWM3 output
VSSC/P	9	digital ground for $\mu$ -Controller core and periphery
P0.5	10	port 0.5 (8mA current sinking capability for direct drive of LEDs)
P0.6	11	port 0.6 (8mA current sinking capability for direct drive of LEDs)
VSSA	12	analog ground of Teletext decoder and digital ground of TV-processor
SECPLL	13	SECAM PLL decoupling
VP2	14	2nd supply voltage TV-processor (+8V)
DECDIG	15	decoupling digital supply of TV-processor
PH2LF	16	phase-2 filter
PH1LF	17	phase-1 filter
GND3	18	ground 3 for TV-processor
DECBG	19	bandgap decoupling
AVL/EWD <sup>(1)</sup>	20	Automatic Volume Levelling/East-West drive output
VDRB	21	vertical drive B output
VDRA	22	vertical drive A output
IFIN1	23	IF input 1
IFIN2	24	IF input 2
IREF	25	reference current input
VSC	26	vertical sawtooth capacitor
TUNERAGC	27	tuner AGC output
AUDEEM/SIFIN1 <sup>(1)</sup>	28	audio deemphasis or SIF input 1
DECSDEM/SIFIN2 <sup>(1)</sup>	29	decoupling sound demodulator or SIF input2
GND2	30	ground 2 for TV processor
SNDPLL/SIFAGC <sup>(1)</sup>	31	narrow band PLL filter/AGC sound IF
AVL/SNDIF/REFO/ AMOUT <sup>(1)</sup>	32	Automatic Volume Levelling/sound IF input/subcarrier reference output/AM output
HOUT	33	(non controlled)
FBISO	34	horizontal output
AUDEXT/ QSSO/AMOUT <sup>(1)</sup>	35	flyback input/sand castle output
EHTO	36	external audio input/QSS intercarrier out/AM audio output (non controlled)
PLLIF	37	EHT/overvoltage protection input
IFVO/SVO	38	IF-PLL loop filter
VP1	39	IF video output/selected CVBS output
CVBSINT	40	main supply voltage TV-processor (+8V)
GND1	41	internal CVBS input
CVBS/Y	42	ground 1 for TV-processor
CHROMA	43	external CVBS/Y input
AUDOUT/AMOUT <sup>(1)</sup>	44	chrominance input (SVHS)
INSSW2	45	2nd RGB/YUV insertion input
R2/VIN	46	2nd R input/V (R-Y) input
G2/YIN	47	2nd G input/U input

## SERVICE MANUAL

SYMBOL	PIN	DESCRIPTION
B2/UIN	48	2nd B input/U (B-Y) input
BCLIN	49	beam current limiter input/(V-guard input, note2)
BLKIN	50	black current input/(V-guard input, note2)
RO	51	Red output
GO	52	Green output
BO	53	Blue output
VDDA	54	analog supply of Teletext decoder and digital supply of TV-processor (3.3V)
VPE	55	OTP programming Voltage
VDDC	56	digital supply to core (3.3V)
OSCGND	57	oscillator ground supply
XTALIN	58	crystal oscillator input
XTALOUT	59	crystal oscillator output
RESET	60	reset
VDDP	61	digital supply to periphery (+3.3V)
P1.0/INT1	62	port 1.0 or external interrupt 1 input
P1.1/TO	63	port 1.1 or Counter/Timer 0 input
P1.2/INT0	64	port 1.2 or external interrupt 0 input

### Notes

- 1)The function of pin 20, 28, 29, 31, 32, 35 and 44 is dependent on the IC version (mono intercarrier FM demodulator/QSS IF amplifier and East-West output or not) and on some software control bits. The valid combinations are given in table 5.

**Table 6 Pin functions for various versions**

IC version	FM-PLL Version				QSS Version					
East-West Y/N	N		Y		N			Y		
CMB1/CM BO bits	00	01/10/11	00	01/10/11	00	01/10/11		00	01/10/11	
AM bit	-	-	-	-	-	0	1	-	0	1
Pin 20	AVL		EWD		AVL			EWD		
Pin 28	AUDEEM				SIFIN1					
Pin 29	DECSDEM				SIFIN2					
Pin 31	SNDPLL				SIFAGC					
Pin 32	SNDIR <sup>(1)</sup>	REFO <sup>(2)</sup>	AVL/SNDIF <sup>(1)</sup>	REFO <sup>(2)</sup>	AMOUT	REFO <sup>(2)</sup>		AMOUT	REFO <sup>(2)</sup>	
Pin 35	AUDEXT				AUDEXT	QSSO	AMOUT	AUDEXT	QSSO	AMOUT
Pin44	AUDOUT				Controlled AM or audio out					

### Notes

- 1)When additional(external) selectivity is required for FM-PLL system pin 32 can be used as sound IF input. This function is selected by means of SIF bit in subaddress 28H.
- 2)The reference output signal is only available for the CMB1/CMBO setting of 0/1. For the other settings this pin is a switch output.

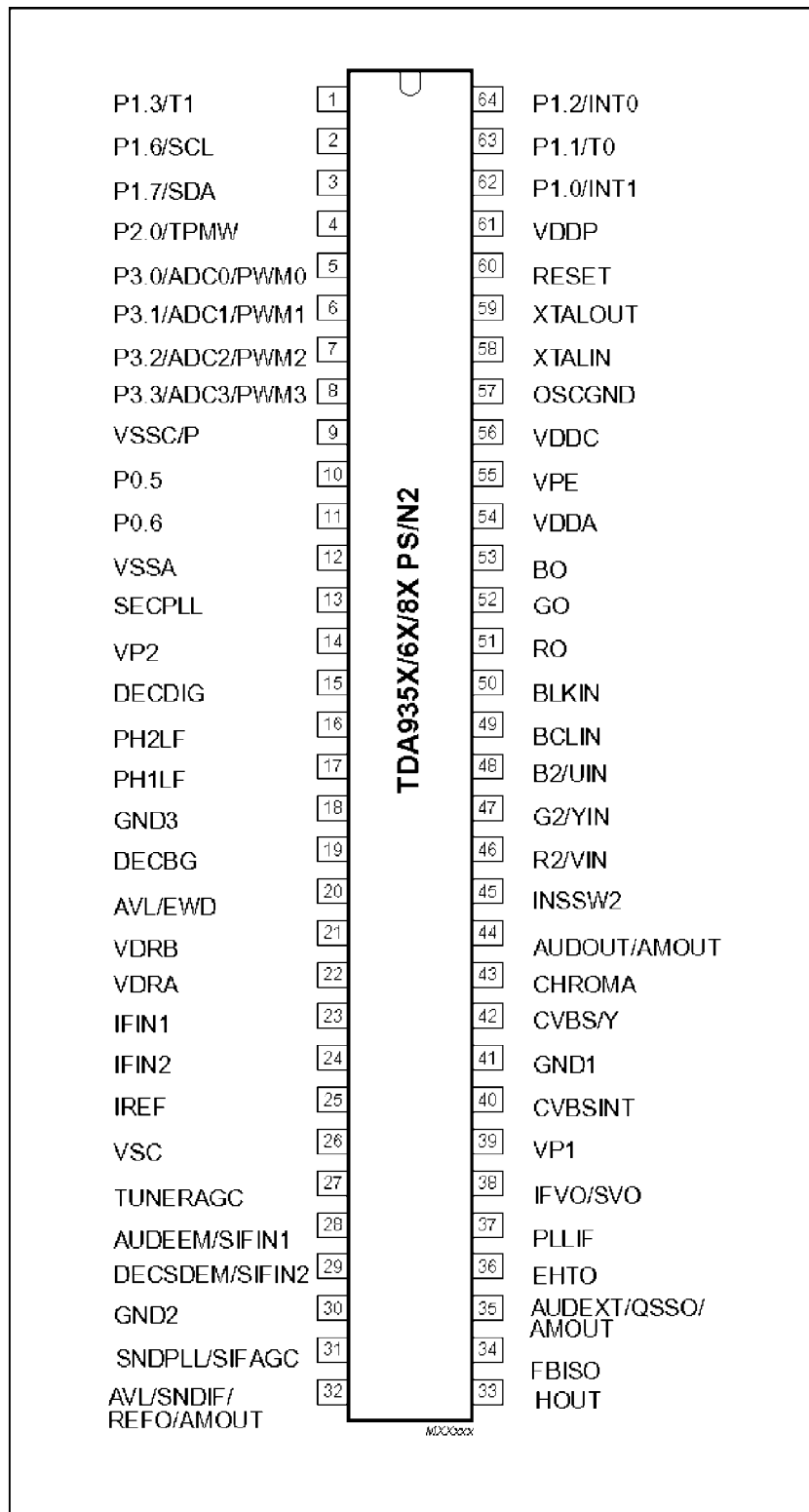


Fig.8 Pin Configuration (SDIP 64)

## 1.2 5 W Mono BTL Audio Amplifier with DC Volume Control TDA7056B

### (1) Features

- DC volume control
- Few external components
- Mute mode
- Thermal protection
- Short-circuit proof
- No switch-on and switch-off clicks
- Good overall stability
- Low power consumption
- Low HF radiation
- ESD protected on all pins.

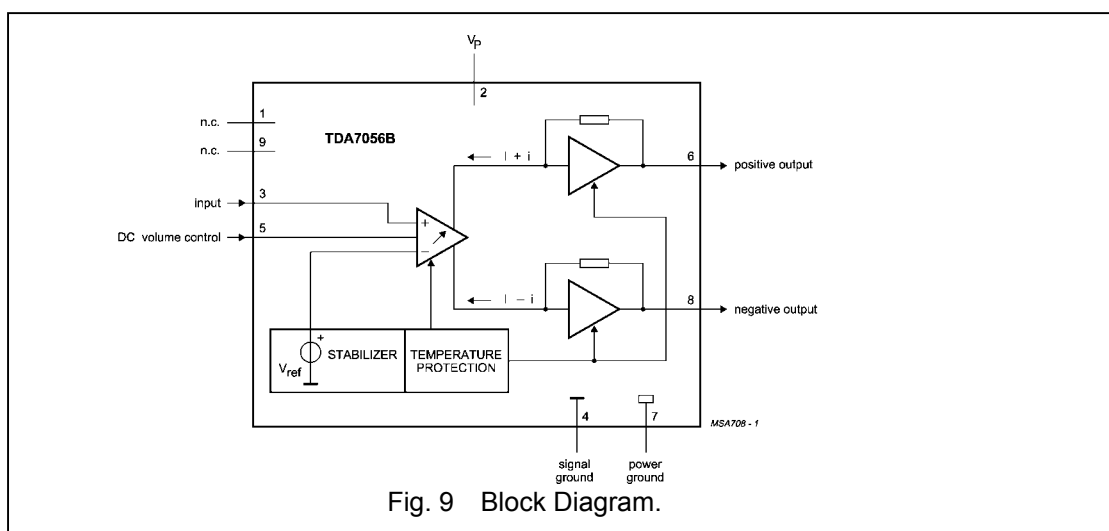
### (2) General Description

The TDA7056B is a mono Bridge-Tied Load (BTL) output amplifier with DC volume control.

It is designed for use in TV and monitors, but is also suitable for battery-fed portable recorders and radios. The device is contained in a 9-pin medium power package.

A Missing Current Limiter (MCL) is built in. The MCL circuit is activated when the difference in current between the output terminal of each amplifier exceeds 100 mA (300 mA typ.). This level of 100 mA allows for headphone applications (single-ended).

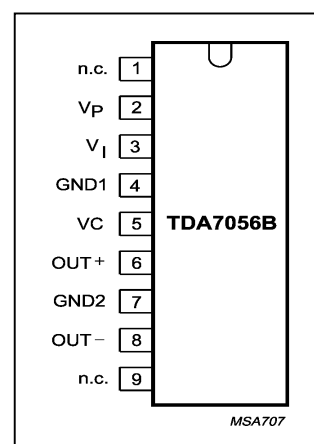
### (3) Block Diagram



### (4) Pinning

Table 7

Symbol	Pin	Description
n.c.	1	Not connected
VP	2	Positive supply voltage
VI	3	Voltage input
GND1	4	Signal ground
VC	5	DC volume control
OUT+	6	Positive output
GND2	7	Power ground
OUT-	8	Negative output
n.c.	9	Not connected



### 1.3 Vertical scan output stage circuit TDA8356/N6

#### DC-coupled vertical deflection circuit TDA8356

##### 1) Features

- Few external components
- Highly efficient fully DC-coupled vertical output bridge circuit
- Vertical flyback switch
- Guard circuit
- Protection against:
  - Short-circuit of the output pins (7 and 4)
  - Short-circuit of the output pins to VP.
- Temperature protection
- High EMC immunity because of common mode inputs
- A guard signal in zoom mode.

##### 2) General Description

The TDA8356 is a power circuit for use in 90, and 110, colour deflection systems for field frequencies of 50 to 120 Hz. The circuit provides a DC driven vertical deflection output circuit, operating as a highly efficient class G system.

##### 3) Block Diagram

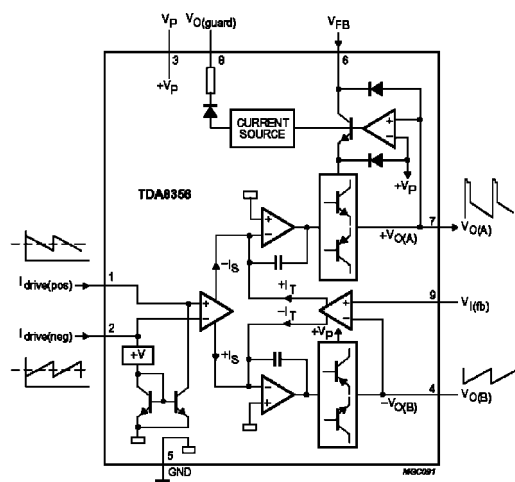


Fig.11

##### 4) Pinning

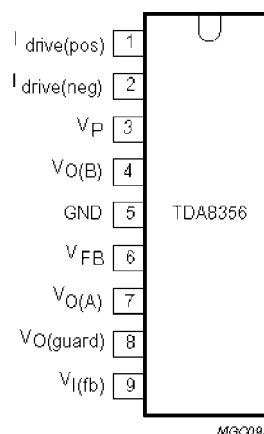


Fig.12

Table 8

SYMBOL	PIN	DESCRIPTION
Idrive(pos)	1	input power-stage (positive); includes II(sb) signal bias
Idrive(neg)	2	input power-stage (negative); includes II(sb) signal bias
VP	3	operating supply voltage
VO(B)	4	output voltage B
GND	5	ground
VFB	6	input flyback supply voltage
VO(A)	7	output voltage A
VO(guard)	8	guard output voltage
VI(fb)	9	input feedback voltage

## 1.4 EEPROM AT24C08

### 1) Features

- Data EEPROM internally organized as 1024/2048 bytes and 64/128 pages×16 bytes
- Page protection mode, flexible page-by-page hardware write protection
  - Additional protection EEPROM of 64/128 bits, bit per data page
  - 1-Protection setting for each data page by writing its protection bit
  - Protection management without switching WP pin
- Low power CMOS
- Vcc=2.7 to 5.5V operation
- Two wire serial interface bus, I<sup>2</sup>C-Bus compatible
- Filtered inputs for noise suppression with Schmitt trigger
- Clock frequency up to 400 kHz
- High programming flexibility
  - Internal programming voltage
  - Self timed programming cycle including erase
  - Byte-write and page-write programming, between 1 and 16 bytes
  - Typical programming time 6ms(<10ms) for up to 16 bytes
- High reliability
  - Endurance 10<sup>6</sup> cycles<sup>1)</sup>
  - Data retention 40 years<sup>1)</sup>
  - ESD protection 4000 V on all pins
- 8 pin DIP/DSO packages
- Available for extended temperature ranges
  - Industrial: -40 °C to +85 °C
  - Automotive: -40 °C to +125 °C

### 2) Pin Configuration

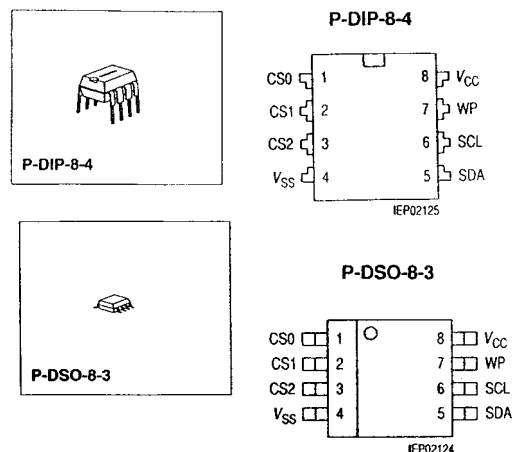


Fig. 13

### 3) Block Diagram

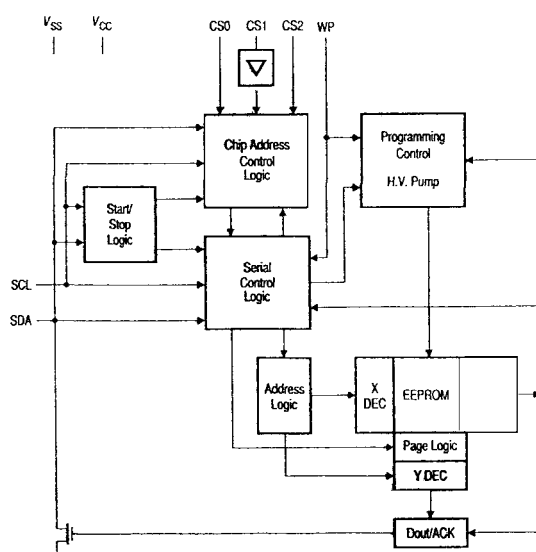


Fig. 14

The Series STR-G5653/F6654 is specifically designed to satisfy the requirements for increased integration and reliability in off-line quasi-resonant flyback converters. The series incorporates a high-precise error amplifying control and drive circuit with discrete avalanche-rated power MOSFET, featuring fewer external components, small-size and standard power supply.

Covering the power range from below 25 watts up to 300 watts for 100/115/230 VAC inputs, and up to 150 watts for 85 to 265 VAC universal input, these devices can be used in a range of applications, from battery chargers and set top boxes, to televisions, monitors, and industrial power supply units. Cycle-by-cycle current limiting, under-voltage lockout with hysteresis, over-voltage protection, and thermal shutdown protects the power supply during the normal overload and fault conditions. Low-current startup and a low-power standby mode selected from the secondary circuit completes a comprehensive suite of features. The series is provided in a five-pin overmolded SIP style package, affording dielectric isolation without compromising thermal characteristics.

- Flyback Operation with Quasi-Resonant Soft Switching for Low Power Dissipation and EMI
- Rugged Avalanche-Rated MOSFET
- Soft drive circuit MOSFET
- Adjustable MOSFET switching speed
- Choice of MOSFET Voltage and  $r_{DS(on)}$
- Full Over-Current Protection (no blanking)
- Under-Voltage Lockout with Hysteresis
- Over-Voltage Protection
- Direct Voltage Feedback
- Low Start-up Current (100  $\mu$  Amax)
- Low-Frequency, Low-Power Standby Operation
- Overmolded 5-Pin Package

The diagram illustrates the internal architecture of the UC1845B, a monolithic integrated circuit designed for driving power MOSFETs. The circuit is enclosed in a dashed rectangular boundary, with pins 1 through 4 and a GROUND connection indicated on the right side.

- Pin 4 (VIN):** The input supply voltage, which is connected to the UVLO (Under-Voltage Lock-Out) block and the DRIVE REG. (Drive Regulator) block.
- Pin 3 (DRAIN):** The output terminal connected to the drain of the MOSFET.
- Pin 2 (SOURCE):** The output terminal connected to the source of the MOSFET.
- Pin 1 (FEEDBACK & OVER-CURRENT PROTECTION):** The feedback input for the error amplifier and the over-current protection input.
- GROUND:** The common reference point for the circuit.

**Internal Functional Blocks and Components:**

- UVLO (Under-Voltage Lock-Out):** A block that monitors VIN and provides a signal to the REF. (Reference) block.
- REF. (Reference):** A block that provides a reference voltage to the OVER-VOLT. PROTECT. (Over-Voltage Protection) block.
- OVER-VOLT. PROTECT.:** A block that monitors the output voltage and provides a signal to the FAULT LATCH block.
- FAULT LATCH:** A block that latches the fault signal and provides a signal to the DRIVE REG. block.
- DRIVE REG. (Drive Regulator):** A block that regulates the output voltage and provides a signal to the MOSFET gate.
- MOSFET:** A power MOSFET whose gate is driven by the DRIVE REG. block. The drain is connected to Pin 3 (DRAIN) and the source to Pin 2 (SOURCE).
- OSC. (Oscillator):** A block that generates a sawtooth waveform for the frequency compensation network.
- Frequency Compensation Network:** Consists of a resistor  $r_{SS}$  and a capacitor  $C_{SS}$  connected to the OSC. block and the inverting input of the error amplifier.
- Error Amplifier:** A two-stage amplifier with a non-inverting input (+) connected to Pin 1 (FEEDBACK & OVER-CURRENT PROTECTION) and an inverting input (-) connected to the frequency compensation network. The output of the error amplifier is connected to the gate of the MOSFET.
- 1.45 V and 0.73 V:** Internal reference voltages used for the error amplifier and the frequency compensation network.

29

### 3). Pin Configuration and Functions

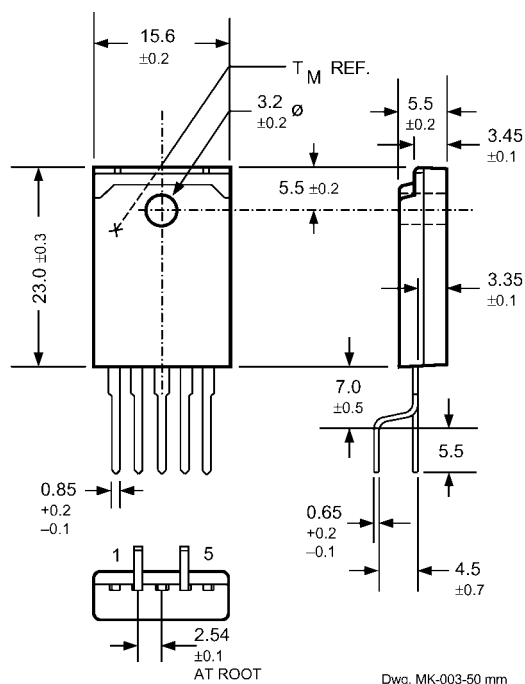


Fig.16

Table 9 Pin function for STR-G5653

Pin No.	Symbol	Function Description
1	D	MOSFET drain
2	S	MOSFET source
3	GND	Ground
4	V <sub>IN</sub>	Supply voltage input for control circuit
5	OCP/FB	Over-current protection detection signal/ voltage-limiting signal input

Table 10 Pin function for STR-F6654

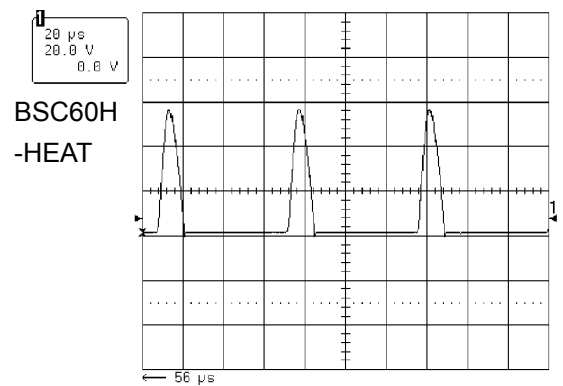
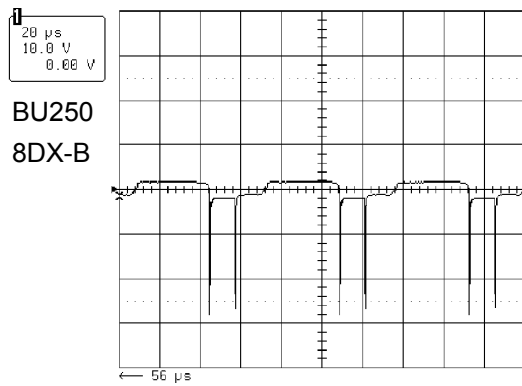
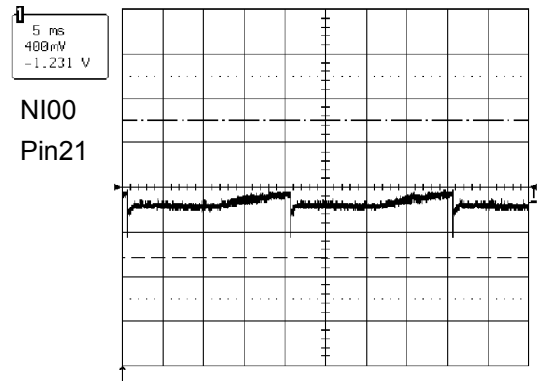
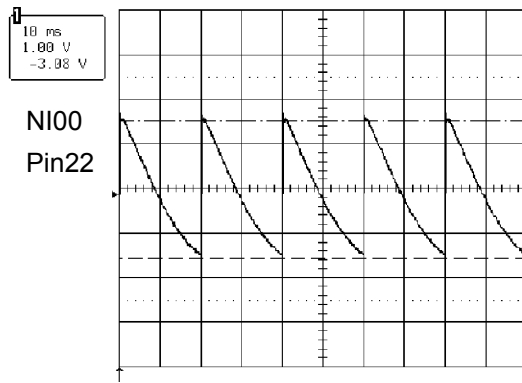
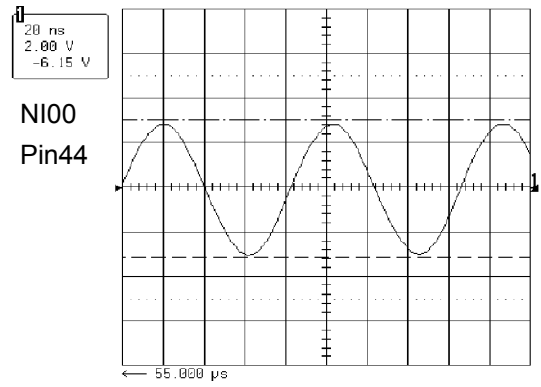
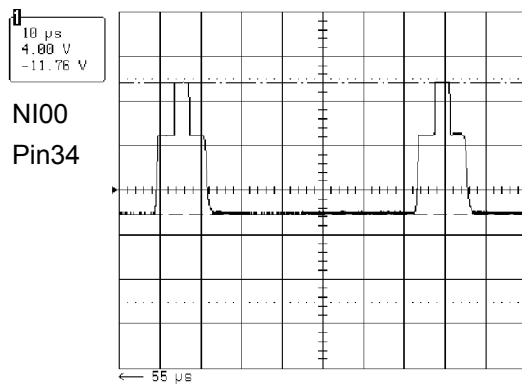
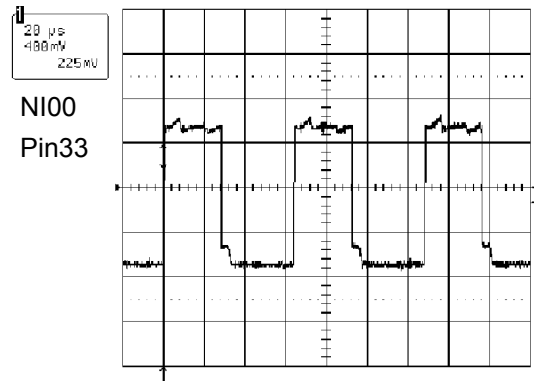
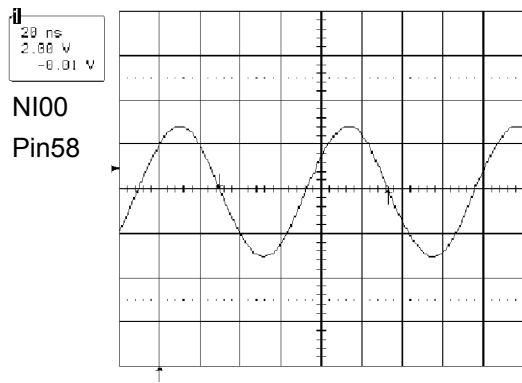
Pin No.	Symbol	Function Description
1	OCP/FB	Over-current protection detection signal/ voltage-limiting signal input
2	S	MOSFET source
3	D	MOSFET drain
4	V <sub>IN</sub>	Supply voltage input for control circuit
5	GND	Ground

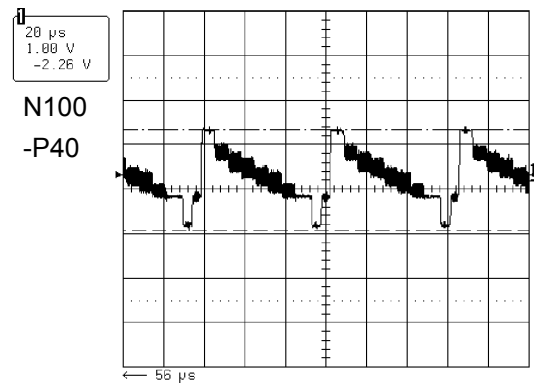
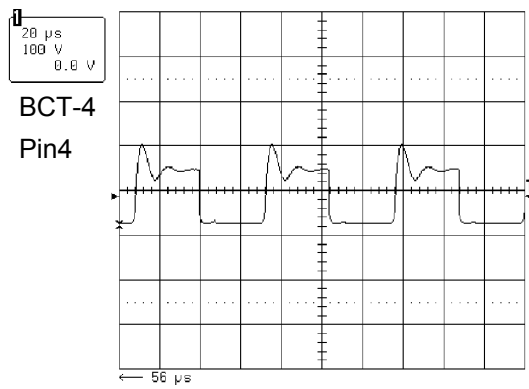
### 4). Difference between STR-G5653 and STR-F6654

- Different size: STR- F6654 is larger
- Different pin functions
- Different electric characteristics: Larger power output, switching current, avalanche-rated and internal allowable power consumption for STR-F6654
- internal allowable power consumption for STR-F6654



## 2. WAVEFORMS OF KEY POINTS





## Notes:

- ① The waveforms are only for reference.
- ② The waveforms may differ dependent on different models.

### 3. KEY ICS SERVICE DATA

**Table 11    Function and Service Data of TDA7056B (N600B)'s Pins**

Pin No.	Function Description	Digital Multimeter		
		Reference Voltage (V)	Positive Resistance (20K $\Omega$ )	Negative Resistance (20K $\Omega$ )
1	Not connected	0	$\infty$	$\infty$
2	Positive supply voltage	16	0.4	0.4
3	Voltage input	2	7.4	33
4	Signal ground	0	0	0
5	DC volume control	0	7	9
6	Positive output	8	6	7.4
7	Power ground	0	0	0
8	Negative output	8	6	7.4
9	Not connected	0	$\infty$	$\infty$

**Table 12    Function and Service Data of TDA8356 (N401)'s Pins**

Pin No.	Symbol	Digital Multimeter : Victor DT890D		
		Reference Voltage (V)	Positive Resistance (K $\Omega$ )	Negative Resistance (K $\Omega$ )
1	Idrive (pos)	2.4	27.7	20.3
2	Idrive (neg)	2.4	27.7	20.4
3	VP	15.4	26.3	13.5
4	VO (B)	7.7	6.1	6.1
5	GND	0	0	0
6	VFB	45.0	113.3	13.7
7	VO (A)	7.5	6.1	6.1
8	VO(guard)	0.2	10.0	9.7
9	VI(fb)	7.7	6.1	6.1

**Table 13    Function and Service Data of TDA9351PS/N2/3I (N100)'s Pins**

Pin No.	Symbol	Digital Multimeter : Victor DT890D		
		Reference Voltage (V)	Positive Resistance (K $\Omega$ )	Negative Resistance (K $\Omega$ )
1	P1.3/T1	3.8	9.5	9.5
2	P1.6/SCL	3.4	6.8	6.8
3	P1.7/SDA	3.0	6.8	6.8
4	P2.0/TPWM	1.8	36.2	17.9
5	P3.0/ADC0/PWM0	0.1	11.8	12.3
6	P3.1/ADC1/PWM1	0.1	5.0	5.0
7	P3.2/ADC2/PWM2	0.02	13.5	13.5
8	P3.3/ADC3/PWM3	0.7	10.7	9.3

(continued)

# SERVICE MANUAL

9	VSSC/P	0	0	0
10	P0.5	0.01	13.3	13.3
11	P0.6	4.2	11.6	11.0
12	VSSA	0	0	0
13	SECPLL	2.3	27.6	21.7
14	VP2	8.0	1.8	1.8
15	DECDIG	5.0	23.1	16.1
16	PH2LF	3.2	27.5	21.0
17	PH1LF	3.9	27.9	21.2
18	GND3	0	0	0
19	DECBG	4.0	24.4	18.7
20	AVL/EWD (1)	0.01	27.6	21.2
21	VDRA	2.4	27.6	20.4
22	IFIN1	2.4	27.6	20.3
23	IFIN2	1.8	24.7	19.8
24	IREF	1.8	24.7	19.9
25	TUNERAGC	3.8	25.3	20.5
26	AUDEEM/SIFIN1(1)	3.8	27.7	21.5
27	DECSDEM/SIFIN2(1)	1.6	8.4	8.4
28	GND2	3.2	27.1	20.7
29	VSSA	2.3	27.8	21.6
30	SECPLL	0	0	0
31	SNDPLL/SIFAGC(1)	2.3	27.8	21.8
32	AVL/SNDIF/REF0/AMOUT(1)	0.2	27.2	20.4
33	HOUT	0.4	5.3	5.3
34	FBISO	0.5	24.0	18.8
35	AUDEXT/QSSO/AMOUT(1)	3.7	27.8	21.5
36	AUDEXT/	1.6	18.7	16.0
37	QSSO/AMOUT(1)	2.4	27.8	21.5
38	AUDEXT/	3.3	24.0	21.1
39	QSSO/AMOUT(1)	7.7	1.8	1.8
40	AUDEXT/	3.8	27.5	21.2
41	GND1	0	0	0
42	CVBS/Y	3.3	27.5	21.2
43	CHROMA	1.4	26.8	20.9
44	AUDOUT /AMOUT(1)	3.3	27.5	21.5
45	INSSW2	1.6	1.0	1.0
46	R2/VIN	2.6	28.0	21.7
47	G2/YIN	2.6	28.0	21.7
48	B2/UIN	2.6	28.0	21.7

(continued)

## SERVICE MANUAL

49	BCLIN	2.5	27.6	20.8
50	BLKIN	6.0	27.9	21.3
51	RO	2.6	1.1	1.1
52	GO	2.5	1.1	1.1
53	BO	2.4	1.1	1.1
54	VDDA	3.2	11.0	11.3
55	VPE	0	0	0
56	VDDC	3.2	11.0	11.3
57	OSCGND	0.02	-	-
58	XTALIN	-	-	-
59	XTALOUT	-	-	-
60	RESET	0	0	0
61	VDDP	3.2	11.0	11.3
62	P1.0/INT1	0	-	-
63	P1.1/T0	1.5	3.3	3.3
64	P1.2/INT0	5.0	18.2	17.5

**Table 14 Functions and Service Data of AT24C08 (N200)'s Pins**

Pin No.	Function Description	Digital Multimeter		
		Reference Voltage (V)	Positive Resistance (20K $\Omega$ )	Negative Resistance (20K $\Omega$ )
1	Address input	0.00	0.00	0.00
2	Address input	0.00	0.00	0.00
3	Address input	0.00	0.00	0.00
4	Common ground	0.00	0.00	0.00
5	Clock line	4.94	6.85	4.83
6	Data line	4.94	6.89	5.15
7	PW write protect	4.94	9.58	6.31
8	Supply voltage	4.94	3.5	3.25

### Notes:

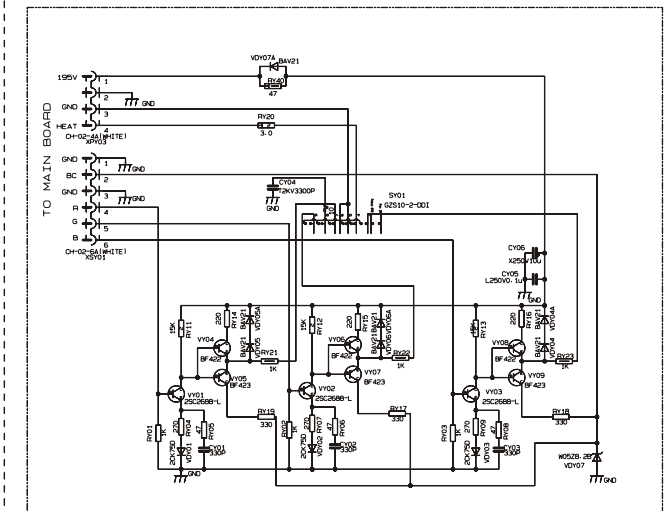
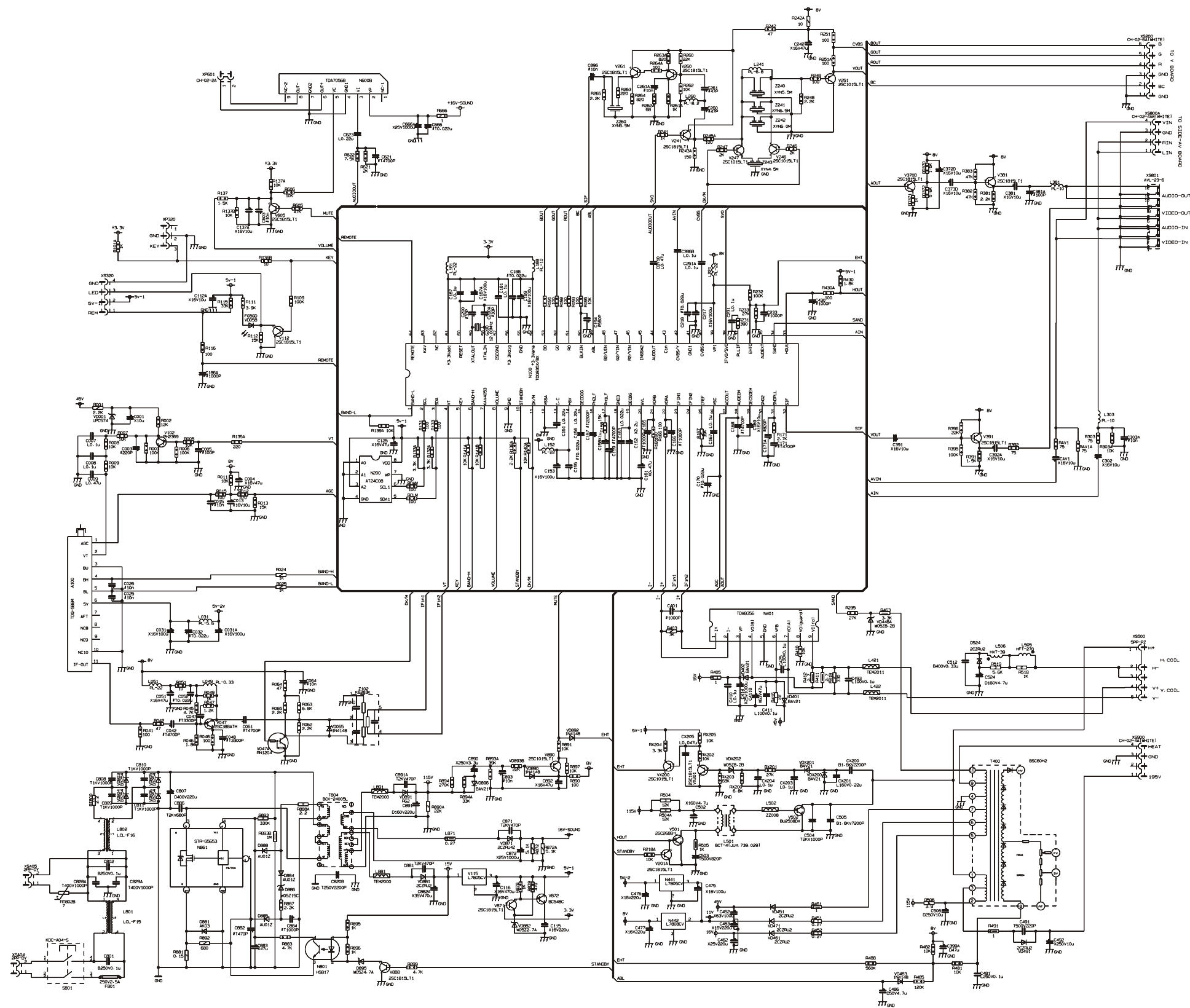
- ③ The data are only for reference.
- ④ The data sheet may differ dependent on different models.

## 4. REPLACEMENT OF PARTS

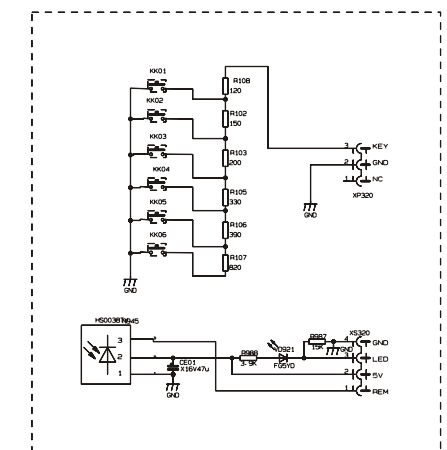
### 4.1 *Description*

Many electrical and mechanical components in this chassis have special safety-related characteristics. Components which have these special safety characteristics in this manual and its supplements are identified by the international hazard symbols or UL, FCC, FDA or VDE marking on the circuit diagram and parts list. When replacing any of these components, substitute the one which has the same safety characteristics as specified in the manual.

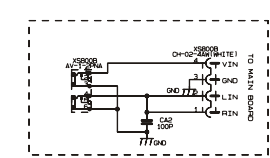
# Circuit Diagram for 14BM18



Y BOARD



K BOARD

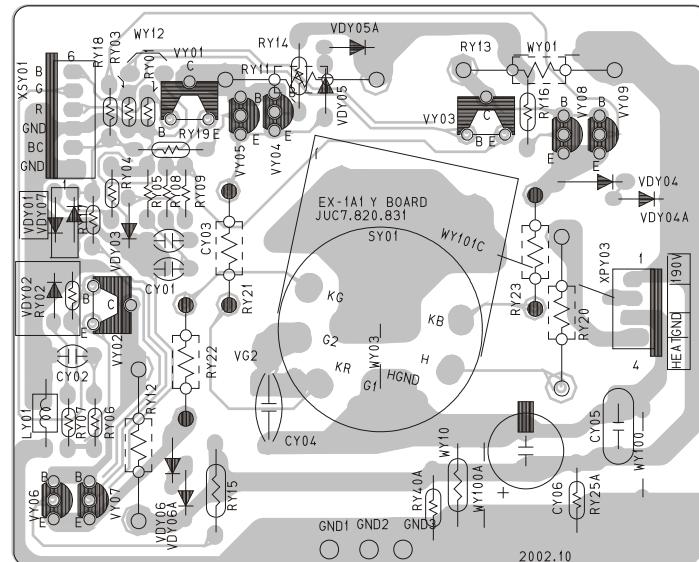


SIDE-AV BOARD

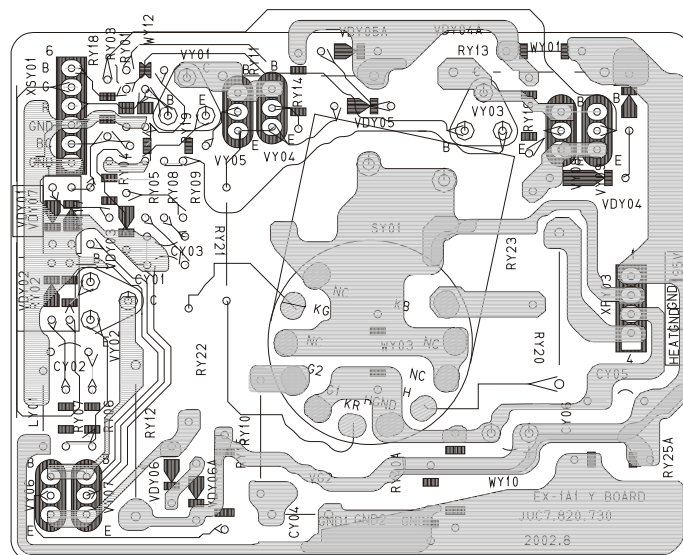
1 Components having special safety-related characteristics are identified by marking "A". Always be certain that the specified replacement parts are used.  
 2  $\Delta$  Heat grounding  $\Delta$  Cold grounding  
 3 See Replacement Part List for Components specifications

# CRT RGB PCB

(For IRICO CRT only)

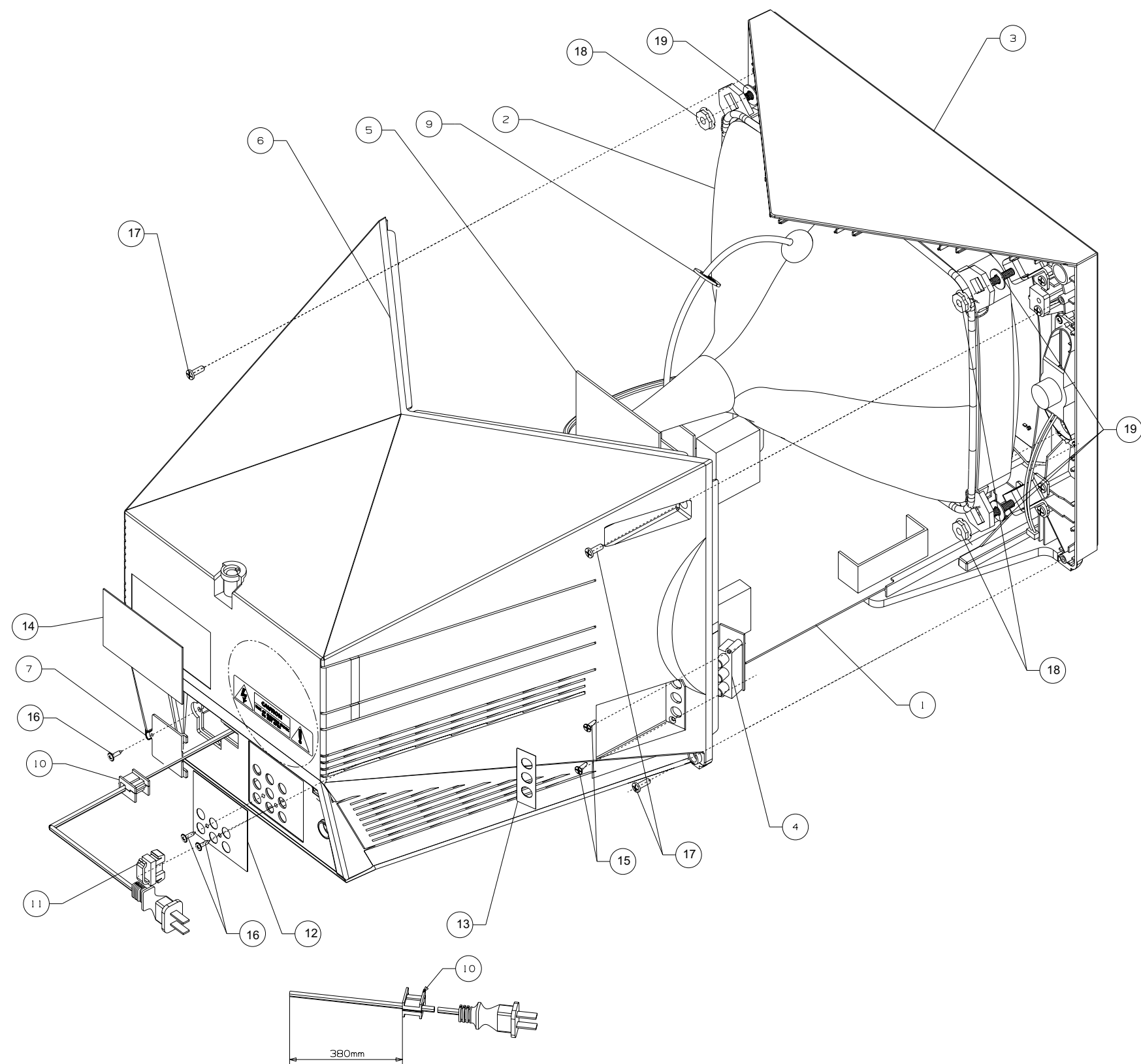


(For BMCC CRT or Indonesia-based LG CRT or THAI CRT or Chunghwa CRT only)





# Final Assembly Diagram for 14BM18



22		Warning label	1	
21		Certification	1	
20		Wire clip XJ-100	1	
19		Rubber washer	4	
18		M5 notched washer nut	4	
17		Tapping screw 4X20BAHCh	4	
16		Tapping screw 3X12VwAHCh	3	
15		Tapping screw 3X10KTHCh	2	
14		Rear plate	1	
13		Side-set AV plate	1	
12		AV plate	1	
11		Wire clip	1	
10		Wire clip A	1	
9		Distance clip	1	
8		Fragile Label	1	
7		Cover board	1	
6		Back cover	1	
5		CRT RGB PCB assembly	1	
4		Side-set AV PCB assembly	1	
3		Front cover assembly	1	
2		CRT assembly	1	
1		Main PCB assembly	1	
Serial No.	Code No.	Parts	Qty	Remarks

## Final Wiring Diagram for 14BM18

